

REMARKS

The Office Action mailed August 1, 2006 has been carefully reviewed and the foregoing amendment has been made in consequence thereof.

Claims 1-2, 4-6, 8-10, 12-15, 17, 19-20, and 22-24 are now pending in this application. Claims 1-25 stand rejected. Claims 3, 7, 11, 16, 18, 21, and 25 have been cancelled.

The rejection of Claims 1 and 17 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,144,201 to Miyazaki (hereinafter referred to as “Miyazaki”) is respectfully traversed.

Miyazaki describes an MRI system and an MRI method for timing the MRI scans based on a synchronization period, which is an average of a plurality of ECG signals. As recited at column 7, lines 32-51, the MRI system includes “a feature of performing a cardiac synchronization imaging scan at a predetermined cardiac synchronization time. To be specific, the host computer 6 performs a preparing MR scan and imaging MR scan, as shown in FIG. 2, in the execution of a main program.... The preparing MR scan...is used for performing a preparing sequence for predetermining a synchronization time incorporated into the imaging MR scan which follows the preparing MR scan. The imaging MR scan...is used for performing a sequence using a cardiac synchronization method based on the synchronization time predetermined by the ECG-prep scan.”

Claim 1 recites a method for generating an image of a heart at a selected cardiac phase, the method includes “acquiring a first electrocardiogram (ECG) of the heart at a first phase; generating a phase-delayed ECG of the heart at the first phase by using a filter to filter and introduce a time delay into the first ECG; determining if the phase-delayed ECG and the first ECG have the same approximate information; and generating an image of the heart if the phase-delayed ECG and the first ECG have the same approximate information.”

Miyazaki does not describe nor suggest a method for generating an image of a heart at a selected cardiac phase as recited in Claim 1. More specifically, Miyazaki does not describe nor suggest generating a phase-delayed ECG of the heart by using a filter to filter and introduce a time delay into the first ECG, determining if the phase-delayed ECG and the first ECG have the same approximate information, and generating an image of the heart if the phase-delayed ECG and the first ECG have the same approximate information.

Rather, in contrast to the claimed invention, Miyazaki describes an MRI method that includes performing a preparing MRI scan to determine a synchronization time and then performing an imaging MRI scan where the timing of the images is based upon the synchronization time.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Miyazaki.

Claim 17 recites a magnetic resonance imaging (MRI) system including a radio frequency (RF) coil assembly for imaging a subject volume, and a computer coupled to the RF coil, the computer configured to “acquire a first electrocardiogram (ECG) of the heart at a first phase; generate a phase-delayed ECG of the heart at the first phase by filtering and introducing a time delay into the first ECG; determine if the phase-delayed ECG and the first ECG have the same approximate information; and generate an image of the heart if the phase-delayed ECG and the first ECG have the same approximate information.”

Miyazaki does not describe nor suggest a magnetic resonance imaging system as recited in Claim 17. More specifically, Miyazaki does not describe nor suggest a computer configured to generate a phase-delayed ECG of the heart by using a filter to filter and introduce a time delay into the first ECG, determine if the phase-delayed ECG and the first ECG have the same approximate information, and generate an image of the heart if the phase-delayed ECG and the first ECG have the same approximate information.

Rather, in contrast to the claimed invention, Miyazaki describes an MRI method that includes performing a preparing MRI scan to determine a synchronization time and then

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performing an imaging MRI scan where the timing of the images is based upon the synchronization time.

Accordingly, for at least the reasons set forth above, Claim 17 is submitted to be patentable over Miyazaki.

For the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 1 and 17 be withdrawn.

The rejection of Claims 1-3 and 17-18 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,052,398 to Gober (hereinafter referred to as "Gober") is respectfully traversed.

Gober describes a system for real time heart imaging using a QRS filter. The filter includes a low-pass filter 42 and a high-pass filter 44 in series, and a gyroscan unit for generating images. The low-pass filter 42 attenuates those portions of the QRS signal applied as an input and having a frequency above a given range to produce a first output signal. "The low pass filter imposes a first given phase shift on the output signal relative to the input signal. A high pass filter responsive to the output signal applied as an input thereto attenuates those portions of the input signal applied thereto below the given range to produce a second output signal. The high pass filter imposes a second given phase shift relative to the time delay of the first output signal. The low and high pass filters are arranged so that the first and second phase shifts substantially cancel one another such that there is negligible time delay between the QRS signal applied to the low pass filter and the second output signal." (Col. 2; lines 11-18.) The gyroscan unit triggers in response to the peaks from the filtered signals and generates the images.

Claim 1 is recited above.

Gober does not describe nor suggest a method for generating an image of a heart at a selected cardiac phase as recited in Claim 1. More specifically, Gober does not describe nor suggest generating a phase-delayed ECG of the heart by using a filter to filter and introduce a time delay into the first ECG, determining if the phase-delayed ECG and the first ECG have

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the same approximate information, and generating an image of the heart if the phase-delayed ECG and the first ECG have the same approximate information.

Rather, in contrast to the claimed invention, Gober describes a system for real time heart imaging using a low-pass filter and a high-pass filter in series.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Gober.

Claim 3 has been canceled. Claim 2 depends from independent Claim 1. When the recitations of Claim 2 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claim 2 likewise is patentable over Gober.

Claim 17 is recited above.

Gober does not describe nor suggest a magnetic resonance imaging system as recited in Claim 17. More specifically, Gober does not describe nor suggest a computer configured to generate a phase-delayed ECG of the heart by using a filter to filter and introduce a time delay into the first ECG, determine if the phase-delayed ECG and the first ECG have the same approximate information, and generate an image of the heart if the phase-delayed ECG and the first ECG have the same approximate information.

Rather, in contrast to the claimed invention, Gober describes a system for real time heart imaging using a low-pass filter and a high-pass filter in series.

Accordingly, for at least the reasons set forth above, Claim 17 is submitted to be patentable over Gober.

Claim 18 has been canceled.

For the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 1-3 and 17-18 be withdrawn.

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The rejection of Claims 8-16 and 22-25 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,501,979 to Manning et al. (hereinafter referred to as “Manning”) is respectfully traversed.

Manning describes a medical imaging method that includes receiving ECG signals and peripheral pulse (PPU) signals from a subject and generating reliable synchronization signals to an imaging apparatus for triggering imaging data collection. The synchronization signals represent pre-determined phases of the heart and are based upon information derived from the ECG signals and the PPU signals.

Claim 8 recites a method for generating an image of a heart at a selected cardiac phase using an MRI imaging system, the method includes “acquiring a first electrocardiogram (ECG) of the heart at a first phase; acquiring a second electrocardiogram (ECG) of the heart at the first phase by using a filter to filter and introduce a time delay into the first ECG; determining if the first ECG and the second ECG have the same approximate information; and generating an MRI image of the heart if the first ECG and the second ECG have the same approximate information.”

Manning does not describe nor suggest a method for generating an image of a heart at a selected cardiac phase using an MRI imaging system as recited in Claim 8. More specifically, Manning does not describe nor suggest generating a second ECG of the heart by using a filter to filter and introduce a time delay into the first ECG, determining if the second ECG and the first ECG have the same approximate information, and generating an image of the heart if the second ECG and the first ECG have the same approximate information.

Rather, in contrast to the claimed invention, Manning describes a medical imaging method that includes receiving ECG signals and peripheral pulse signals from a subject and generating reliable synchronization signals to an imaging apparatus for triggering imaging data collection. Manning does not describe generating a second ECG with a time delay.

Accordingly, for at least the reasons set forth above, Claim 8 is submitted to be patentable over Manning.

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Claims 11 has been canceled. Claims 9-10 depend from independent Claim 8. When the recitations of Claims 9-10 are considered in combination with the recitations of Claim 8, Applicants submit that dependent Claims 9-10 likewise are patentable over Manning.

Claim 12 recites a method for generating an image of a heart at a selected cardiac phase, the method including “acquiring a first electrocardiogram (ECG) of the heart at a first phase; acquiring a second electrocardiogram (ECG) of the heart at the first phase by using a filter to filter and introduce a time delay into the first ECG; acquiring a first plethysmograph signal of the heart at the first phase; determining if the first ECG, the second ECG, and the plethysmograph signal have the same approximate information; and generating an MRI image of the heart if the first ECG, the second ECG, and the plethysmograph signal have the same approximate information.”

Manning does not describe nor suggest a method for generating an image of a heart at a selected cardiac phase as recited in Claim 12. More specifically, Manning does not describe nor suggest generating a second ECG of the heart by using a filter to filter and introduce a time delay into the first ECG, acquiring a first plethysmograph signal of the heart at the first phase; determining if the first ECG, the second ECG, and the plethysmograph signal have the same approximate information, and generating an image of the heart if the first ECG, the second ECG, and the plethysmograph signal have the same approximate information.

Rather, in contrast to the claimed invention, Manning describes a medical imaging method that includes receiving ECG signals and peripheral pulse signals from a subject and generating reliable synchronization signals to an imaging apparatus for triggering imaging data collection. Manning does not describe generating a second ECG with a time delay.

Accordingly, for at least the reasons set forth above, Claim 12 is submitted to be patentable over Manning.

Claims 16 has been canceled. Claims 13-15 depend from independent Claim 12. When the recitations of Claims 13-15 are considered in combination with the recitations of

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Claim 12, Applicants submit that dependent Claims 13-15 likewise are patentable over Manning.

Claim 22 recites a computer program embodied on a computer readable medium for controlling a medical imaging system, the program configured to “acquire a first electrocardiogram (ECG) of the heart at a first phase; acquire a second electrocardiogram (ECG) of the heart at the first phase by using a filter to filter and introduce a time delay into the first ECG; determine if the first ECG and the second ECG have the same approximate information; and generate an MRI image of the heart if the first ECG and the second ECG have the same approximate information.”

Manning does not describe nor suggest a computer program embodied on a computer readable medium for controlling a medical imaging system as recited in Claim 22. More specifically, Manning does not describe nor suggest the program configured to generate a second ECG of the heart by using a filter to filter and introduce a time delay into the first ECG, determine if the second ECG and the first ECG have the same approximate information, and generate an image of the heart if the second ECG and the first ECG have the same approximate information.

Rather, in contrast to the claimed invention, Manning describes a medical imaging method that includes receiving ECG signals and peripheral pulse signals from a subject and generating reliable synchronization signals to an imaging apparatus for triggering imaging data collection. Manning does not describe generating a second ECG with a time delay.

Accordingly, for at least the reasons set forth above, Claim 22 is submitted to be patentable over Manning.

Claim 25 has been canceled. Claims 23-24 depend from independent Claim 22. When the recitations of Claims 23-24 are considered in combination with the recitations of Claim 22, Applicants submit that dependent Claims 23-24 likewise are patentable over Manning.

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For the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 8-16 and 22-25 be withdrawn.

The rejection of Claims 4-7 and 19-21 under 35 U.S.C. § 103(a) as being unpatentable over Gober in view of Manning is respectfully traversed.

Gober and Manning are discussed above.

Claim 1 is recited above.

Neither Gober nor Manning, considered alone or in combination, describes or suggests a method for generating an image of a heart at a selected cardiac phase as recited in Claim 1. More specifically, neither Gober nor Manning, considered alone or in combination, describes or suggests generating a phase-delayed ECG of the heart by using a filter to filter and introduce a time delay into the first ECG, determining if the phase-delayed ECG and the first ECG have the same approximate information, and generating an image of the heart if the phase-delayed ECG and the first ECG have the same approximate information.

Rather, in contrast to the claimed invention, Gober describes a system for real time heart imaging using a low-pass filter and a high-pass filter in series, and Manning merely describes a medical imaging method that includes receiving ECG signals and peripheral pulse signals from a subject and generating reliable synchronization signals to an imaging apparatus for triggering imaging data collection. Manning does not describe generating a second ECG with a time delay.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Gober in view of Manning.

Claim 7 has been canceled. Claims 4-6 depend from independent Claim 1. When the recitations of Claims 4-6 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 4-6 likewise are patentable over Gober in view of Manning.

Claim 17 is recited above.

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Neither Gober nor Manning, considered alone or in combination, describes or suggests a magnetic resonance imaging system as recited in Claim 17. More specifically, neither Gober nor Manning, considered alone or in combination, describes or suggests a computer configured to generate a phase-delayed ECG of the heart by using a filter to filter and introduce a time delay into the first ECG, determine if the phase-delayed ECG and the first ECG have the same approximate information, and generate an image of the heart if the phase-delayed ECG and the first ECG have the same approximate information.

Rather, in contrast to the claimed invention, Gober describes a system for real time heart imaging using a low-pass filter and a high-pass filter in series, and Manning merely describes a medical imaging method that includes receiving ECG signals and peripheral pulse signals from a subject and generating reliable synchronization signals to an imaging apparatus for triggering imaging data collection. Manning does not describe generating a second ECG with a time delay.

Accordingly, for at least the reasons set forth above, Claim 17 is submitted to be patentable over Gober in view of Manning.

Claim 21 has been canceled. Claims 19-20 depend from independent Claim 17. When the recitations of Claims 19-20 are considered in combination with the recitations of Claim 17, Applicants submit that dependent Claims 19-20 likewise are patentable over Gober in view of Manning.

For the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 4-7 and 19-21 be withdrawn.

In addition, Applicants respectfully submit that the Section 103 rejection of the presently pending claims is not a proper rejection. As is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. Neither Gober nor Manning, considered alone or in combination, describes or suggests the claimed combination. Furthermore, in contrast to the assertion within the Office Action, Applicants

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respectfully submit that it would not be obvious to one skilled in the art to combine Gober with Manning because there is no motivation to combine the references suggested in the art. In support of obviousness, the Examiner cites the definition of a PPU signal from Manning to include the filtered ECG signal described in Gober. This is contrary to the ordinary meaning of the word and can not be construed in this way. Thus, it would not have been obvious to one having ordinary skill in the art to combine the disclosures of Gober and Manning at the time of the invention.

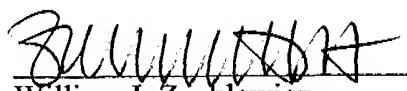
As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. *Ex parte Levingood*, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. *In re Vaeck*, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion or motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Furthermore, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. Further, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. The present Section 103 rejection is based on a combination of teachings selected in an attempt to arrive at the claimed invention. Since there is no teaching nor suggestion in the cited art for the combination, the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants request that the Section 103 rejection be withdrawn.

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In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully submitted,



William J. Zychlewicz
Registration No. 51,366
ARMSTRONG TEASDALE LLP
One Metropolitan Square, Suite 2600
St. Louis, Missouri 63102-2740
(314) 621-5070